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The relationship between bitumen microstructure and viscous flow

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Abstract

Copyright © 2015 Taylor & Francis Group, LLC. To examine the bitumen microstructure, 15 bitumens were analyzed by atomic force microscopy (AFM) and viscometric methods. The results of AFM study indicate that all the bitumen samples have bee structures on the surface. In accordance with the shape and size of these structures bitumens can be divided into three main groups. The surface topography of bitumens examined by AFM was found to be in good agreement with their viscous flow behavior and colloidal structure, determined by the viscometric method. It was shown that bitumens of sol-gel type have the most pronounced ordered bee structures on their surface. On the basis of data obtained it was concluded that the main factor determining the structure of the surface is not only the content of asphaltenes, but their structure. So, the asphaltenes, whose molecules are enriched in condensed polynuclear aromatic units, are responsible for the formation of the ordered bee structures in the bitumens.

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Keywords

AFM, asphaltenes, bitumens, microstructure, viscous flow behavior